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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

June 21, 2001

Magalie Roman Salas, Secretary
Federal Communications Commission
445 12th Street, SW
12th Street Lobby, TW-A325
Washington, DC 20054

Re: *Ex Parte* Presentation in ET Docket No. 98-42

Dear Ms. Salas:

On Tuesday, June 19, 2001, Robert Briskman, Carl Frank, and John Papandrea representing Sirius Satellite Radio Inc. ("Sirius") and Phil Barsky, Bruce Jacobs, and David Konczal representing XM Radio Inc. ("XM Radio") met with Ira Keltz, Julius Knapp, Geraldine Matise, Karen Rackley, John Reed, and Bruce Romano of the FCC's Office of Engineering and Technology ("OET"). The purpose of the meeting was to discuss the implications of joint tests conducted by Sirius, XM Radio, and Fusion Lighting, Inc. on November 3, 2000, which were undertaken at OET's request and which attempted to quantify issues of potential interference/susceptibility between RF lighting devices and satellite DARS receivers operating in the 2320-2345 MHz band. The substance of the meeting is summarized below.

The representatives of Sirius and XM Radio (the "DARS Licensees") began the meeting by explaining that all parties, including Fusion, now agree that out-of-band emissions from Fusion lights will cause harmful interference to satellite DARS receivers. The DARS Licensees then explained that the Communications Act of 1934 and Part 18 of the Commission's Rules make clear that ISM equipment (*i.e.*, an unlicensed service) can only operate if it does not interfere with licensed services, and that manufacturers of such devices must bear the burden of curing the harmful interference their devices cause. Thus, because Fusion's out-of-band emissions into the DARS bands are secondary to the operations of the DARS Licensees, the Commission must adopt an out-of-band emissions standard that protects the DARS Licensees.

The DARS Licensees also explained that Fusion's proposed compromise of 44 dBuV/m at 3 meters is still too high and would cause destructive interference to the satellite signals of Sirius and XM Radio. The DARS Licensees further noted that the WCS community is subject to

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out-of-band emission limits similar to the level Sirius and XM Radio are seeking in this docket (*i.e.*, 18 μV/m at 3 meters), despite the fact that WCS is immediately adjacent to the DARS band, making the suppression much more difficult and expensive.

The DARS Licensees then reminded OET that they had an expectation of protection from harmful interference when they bid for their licenses and constructed their systems, which will commence commercial operations in the coming months. In particular, the DARS Licensees have had an expectation of protection from harmful interference from unlicensed devices based on the clear and mandatory language of Part 18 of the Commission's Rules. This expectation of protection was reinforced by the FCC's 1997 order adopting licensing and service rules for the satellite DARS service as well as the April 1998 Notice of Proposed Rulemaking ("NPRM") that initiated the instant proceeding. These documents make clear that the Commission has long been concerned about the potential of unlicensed devices to interfere with satellite DARS, and that the DARS Licensees, as primary users of spectrum in the 2320-2345 MHz range, are entitled to protection from harmful interference from secondary services.[1]

Now that the engineering conclusions are clear and undisputed, the FCC must promptly adopt rules that *protect* satellite DARS operations at 2320-2345 MHz. The present time is a particularly good moment for such new rules since Fusion has suspended production of its 2450 MHz lights and is working on new lamp design. Attached is an article, from the March 26, 2001 edition of *U.S. News & World Report*, that discusses Fusion's plans to discontinue production and redesign its lights. Copies of this article were distributed to attendees of the meeting.

Sirius and XM Radio next discussed measurement techniques used in the November 3, 2000 joint tests. They explained that, contrary to Fusion's claims, use of a broad video bandwidth—such as 1 MHz—is the only measurement that accurately captures the effect of Fusion's interference to DARS receivers and is, therefore, the appropriate measure. Such measurement bandwidths are used in current ITU interference calculation recommendations.

The DARS Licensees then refuted Fusion's allegation that Sirius and XM Radio have designed systems that are too fragile to merit protection. Sirius and XM Radio explained that it is *irrelevant* whether the DARS systems are particularly sensitive since licensed use of the spectrum by the DARS licensees is primary. They then noted that satellite DARS systems operate well within typical parameters (including link budget margin) for mobile satellite systems, such as GPS. The DARS Licensees also reminded OET that the satellite DARS systems are state of the art and engineered to work under the most technically challenging conditions, such as when the receiver's view of a DARS satellite is obstructed by trees, buildings, or other obstacles. Among other things, the DARS systems have adequate margin built-in so that they can overcome the technical obstacles to service delivery (*e.g.*, multipath fading, shadowing, and blockage).

Sirius and XM Radio then explained that Fusion—perhaps by using solid state exciters--is in the best position to eliminate the interference cheaply. OET staff noted that Fusion has admitted that it would cost roughly $25 million for it to explore ways of redesigning its lights to

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[1] *See Report and Order Memorandum Opinion and Order and Further Notice of Proposed Rulemaking*, IB Docket No. 95-51, FCC 97-70 at ¶ 5 n.5 (Mar. 3, 1997).

minimize out-of-band emissions. In contrast, the solution Fusion proposes—construction of additional terrestrial repeaters—would cost billions of dollars of capital costs and hundreds of millions of dollars of operating costs. In addition, the construction of additional repeaters will make resolution of the disputes between the WCS community and the DARS Licensees even more difficult to resolve.

Sirius and XM Radio also reminded OET staff of the public interest benefits of the satellite DARS systems, particularly rural service and ethnic programming diversity. Additionally, the DARS Licensees explained that, unlike other FCC licensees that have received harmful interference from unlicensed devices, satellite DARS is a consumer subscription service. Because customers of Sirius and XM Radio are paying for ubiquitous, digital quality sound, they will not tolerate harmful interference from Fusion's lights. As explained above, Sirius and XM Radio had every reason to expect at the time they went into business that the Commission would enforce Part 18 of its rules and protect satellite DARS from harmful interference.

At the conclusion of the meeting, the DARS Licensees agreed to see if they could find any creative solutions to the problem of Fusion's interference to DARS operations. However, Sirius and XM Radio reiterated their view that the FCC must, in order to discharge its responsibility to manage the radio spectrum to minimize harmful interference, promptly amend Section 18.305 of its rules to provide that out-of-band field strength limits (within the DARS Band) for RF lights operating in the 2.4 GHz band must be at or below 18 microvolts per meter at 3 meters. Because sound public policy and regulatory efficiency require that Part 18 emission levels be set to prevent known threats of harmful interference, the Commission may not define a "safe harbor" in the instant proceeding. Otherwise, the Commission is inviting needless future litigation and risking public and judicial confusion.

All parties in ET Docket No. 98-42 have received copies of this letter. Should you have any questions regarding the above-discussed meeting with FCC staff on RF lighting issues, please contact the undersigned.

Respectfully yours,

John F Papandrea

Carl R. Frank
John F. Papandrea
Counsel to Sirius Satellite Radio Inc.

cc: Donald Abelson
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Attachment: Article – *U.S. News & World Report*

Science & Ideas 3/26/01

Lighting the way

The first lightbulb ended eons of firelight. Get ready for the next leap in how we illuminate our world

By Charles W. Petit

Thomas Alva Edison would instantly recognize the 2.9 billion electric lightbulbs glowing in American homes and offices today. Their filaments are made of tungsten rather than the carbonized cotton the inventor used 122 years ago, and their globes contain noncorrosive gases rather than a vacuum, but the principle and basic appearance are fundamentally unchanged. Even today, when cartoonists show the birth of a new idea, they draw an Edison-style bulb switching on in the inventor's mind.

But the cartoonists may soon need to modernize their cliché. Engineers, physicists, interior designers, and energy experts are actively seeking new ways to beat back the darkness. The hunt is on for better bulbs, and better lamps to put them in, and already an avalanche of innovation is moving from industrial laboratories to the marketplace.

Futurists have long fantasized about revolutionary forms of illumination, and some of those ideas–walls and curtains that glow softly without glare–may actually be on the horizon. We'll have lights that operate with efficiencies 10 or more times that of Edison's bulb, and cool lights that are not hollow bulbs at all but bits or even vast sheets of plastic and crystal semiconductor. Lamps will change color from the yellowish-white of sunshine to a rainbow of hues on command. Even clothes may light up. Rather than being illuminated by streetlights, some sidewalks and perhaps even the streets themselves may be embedded with lighting.

And if a utility company finds itself in a power pinch, it may simply send a signal to computer chips built into lights throughout its service area. The lights will dim just a bit to ease the grid's load while keeping vital motors like those of elevators fully juiced.

Certainly the pace of invention has picked up since around 1.5 million years ago, when a band of hominids kindled a fire on the African savanna and realized it was a good night light as well as a heater. But that's about where things stayed–augmented only by candles and oil lamps–until the mid-19th century. Even the gas streetlamps that gave a nighttime glow to big industrial cities of the early 1800s were basically just tiny fires.

So Edison had a very good idea in 1879. Various inventors before him had managed to make electric arc lights and other devices, but none was suited to mass use. When Edison invented the first widely successful lightbulb, he was barely in front. Englishman Joseph Swan, among others, was on the same track. The new electric lights were a sensation at the 1881 International Electrical Exhibition in Paris. Just 10 years later, 1,300 lighting companies in America alone were

10 years later, 1,300 lighting companies in America alone were providing electrical power for home lighting.

But for all its simple elegance, Edison's bulb is an inefficient use of energy. Like a fire, it glows because it is hot; indeed, at least 90 percent of the electric energy it consumes goes into heat. Succeeding generations of lights will manipulate the electronic behavior of atoms and molecules to release light, not just heat them to a fierce, white glow.

It won't happen overnight. Consider the compact fluorescent lamp, or CFL. First introduced by Netherlands-based Philips in 1981, CFLs screw into ordinary light sockets. They use about a quarter as much electricity as incandescents. Commercial, industrial, and government agencies are snapping them up, but American homeowners, who now spend about $800 million annually on lightbulbs, have largely ignored them.

Why? First of all, even though CFLs pay for themselves in lower utility bills, many consumers just can't get used to paying close to $10, and often much more, for a lightbulb. After all, they're now paying 60 cents for a passable 100-watt bulb. Plus, CFLs are typically an inch or so longer than incandescents, an awkward fit in many lamps. Many consider their white tubing plain ugly, and their light–while not the stark cold blue-white of early fluorescents–isn't quite as pleasing as an incandescent. Plus, after the switch is turned, CFLs are slow to come on and reach full capacity.

But with manufacturers improving CFLs steadily, and as utilities and environmentalists keep promoting them to cut energy use and the emission of greenhouse gases, CFLs seem bound to catch on. By the time they do, however, other technologies may be ready to grab the market lead. One is the LED, or light-emitting diode, a crystalline semiconductor chip that glows. These are already all around us: LEDs are the little indicator lights on answering machines; clusters of them are used in many traffic and automobile brake signals. A new and related device–the organic light-emitting diode, or OLED–is made of sheets of polymer semiconductor material resembling plastic. Both work by running an electric current across the thin layer of semiconductor, which triggers emission of light. It's this technology that has lighting experts imagining whole walls and floors that glow, dim, and change color.

While the first LEDs came only in red and green when introduced in the 1960s and '70s, they now have a full palette that's capable of making pure white light. Efficiencies, originally abysmal, now rival those of compact fluorescents and could go far higher. Some believe LEDs could someday turn 75 percent of their electric consumption into light, which is roughly 12 times as much as an incandescent.

Question of cost. So far, no LED is bright enough to light a room. Even a small LED flashlight, barely bright enough to read a map by, can cost nearly $50, although its batteries will last 15 times as long as with a standard bulb. "We're starting to get the performance; now all we have to do is get the price down," says M. George Craford, chief technology officer of the San Jose, Calif.-based LumiLeds Lighting.

Plenty of new technologies are vying for the illumination market, though some may not be suitable for home lighting. High-intensity discharge lights, for example–which pass powerful currents through such gases as sodium and mercury–take so long to warm up, and are so bright, that they are suited mainly for outdoor use or stadium lights.

Want a dark horse in the lightbulb sweepstakes? Bet on the sulfur light, a glass sphere about the size of a golf ball filled with gaseous sulfur and energized by an external microwave generator. It has a brilliance 100 times that of a 100-watt incandescent, and color that is almost a perfect match for the sun. There is almost nothing to wear out, and it's about six times as efficient as incandescents. "It's almost like this is

how God meant for us to make lightbulbs," says physicist Leslie Levine, president of Rockville, Md.-based Fusion Lighting.

When the first sulfur lights were made in the early 1990s, the U.S. Department of Energy ballyhooed the concept as a surefire hit, with the potential to take a big bite out of Americans' lighting bills. Early models were soon installed in airplane hangars, mail-sorting facilities, and greenhouses. But there were problems: trouble getting reliable electronic controls; inability to make them work efficiently for most uses (few places need one bulb bright enough to light a hangar); the need to keep the bulb spinning at several hundred revolutions per minute to cool it; and the system's intolerance for dirt. Not to mention the $2,500 price tag. The company pulled it off the market in 1999. Levine predicts sulfur lights will be back, with a better design and all the advantages of the old one, in a few years.

With all the new lighting coming, will the Edison-type bulb be a museum piece soon? "Good grief, no," said Osram Sylvania's technology director, John Gustafson. "It's been around for, what, 140 years? It won't disappear for a long, long time." For that matter, neither will firelight.

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CERTIFICATE OF SERVICE

I hereby certify that on this 21st day of June, 2001, I caused copies of the foregoing ***Ex Parte*** **Presentation in ET Docket No. 98-42** to be mailed via first-class postage prepaid mail to the following:

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